

# Modeling factors influence stay duration in unit due to maxillofacial fracture

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## ABSTRACT

**Introduction:** Different causes such as accidents, physical collisions, falls from height can be a cause of fracture. In different communities, given the age range of patients, social issues, and the use of industrial supplies, the prevalence of fractures are different from each other. The purpose of this study was to determine the types, causes and location of the fractures and the relationships between demographic factors and the above factors. We also tend to examine factors affecting stay duration in inpatients. **Methods:** This is a Retrospective study. In this study, 1665 patients, in the period from March 2011 to March 2014, were suffered from maxillofacial trauma aged 10 years or more. The patients were admitted to maxillofacial unit of Imam Khomeini Hospital, Urmia. **Results:** In this study, there is a significant correlation between the type of fracture and fracture cause with sex. Also, the results obtained from the estimation of COX model with PH have shown that age, fracture cause and fracture types variables (mandibular, maxillary and orbit and other fractures) are significant in stay duration in the hospital that were hospitalized due to fracture. **Conclusion:** Vehicles, due to being faster and more powerful, have also more severe damage, which subsequently causes more hospitalization duration and more expenses incurred by the patient and the hospital.

**Keywords:** Stay duration, fracture, jaw, face

## Introduction

In maxillofacial trauma, nasal bones, cheeks, upper and lower jaw are more hurt. The external nasal consists of cartilage and bone structures that bony part of the nose is made of two nasal bones, frontal appendages of the maxilla and nasal frontal bone and brushed nose <sup>[1]</sup>. Highlighted structure of the nasal bones in the face, causing the fracture of the bone has the most prevalent fractures in the human body and on the other hand fractures of the bones are important beautifully <sup>[2, 3]</sup>. Cheekbones are shaped, so that its outer posterior appendages are attached to the temporal bone and the chewing muscles are attached to them and its upper and lower appendages covers

inner and outer wall of eye sockets and its lower inner part forms lower wall of the eye sockets and attaches to the upper jaw <sup>[2]</sup>. The upper jaw bone is attached from the outside to the cheekbones and from inside to the nasal bones and covers the inner part of the lower wall of the eye sockets and anterior part of the eye sockets and protects the nasal bones <sup>[2, 3]</sup>. Lower jaw is located in one third of lower face and has two parts, which are symmetrically attached to the skull base. Its horseshoe shape and its attachment to both sides of the skull cause to absorb the forces well. For this reason, multiple fractures of the mandible, due to a single force, are unusual also mandibular ramus fracture other than sub-condylar part is uncommon <sup>[2, 4]</sup>. Different causes such as accidents, physical collisions, and falls from height can be a cause of breakage. In different communities given the age range of patients, social issues, and the use of industrial supplies, the prevalence of breakage are different from each other. In a study, the most fractures were due to accidents (52.5%) that among them motorcycle accidents consisted the most cases (42.26%) and the second was fall from a height (24.4%) <sup>[5,6,7]</sup>. In a study, the most face damages were related to males aged 21 to 30 years, also fractures were more because of accidents, falls and physical altercation and mandibular and nose fractures were more common <sup>[6,8,9,10]</sup>. In some societies, most fractures were in age range 13 to 18 years, which were more due to a physical

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altercation [7,11,12,13,14,15]. Various studies on the epidemiology of facial fractures provide information that can be used to perform necessary measures in order to reduce the human and financial costs incurred by the health centers. In this study we tend to examine the frequency of fractures, cause and location of fractures and the relationship between demographic characteristics with the above factors. We also tend to examine factors affecting the length of stay in inpatients due to fracture.

## Materials and Methods

This is a retrospective Retrospective study. In this study, 1665 patients, in the period from March 2011 to March 2014, were suffered from maxillofacial trauma aged 10 years or more. The patients were admitted to maxillofacial unit of Imam Khomeini Hospital, Urmia. In the present study information about the types of fractures, including a broken nose, cheeks, and upper or lower jaw fracture and cause of fracture) such as different types of accidents such as car or bus or bicycle or motorcycle, fighting, falling from height, sports injuries and animal damages) and demographic characteristics of patients were extracted as a checklist from available files. The duration of hospitalization was also examined. The data on the frequency and location of the fracture and the length of stay and demographic data were expressed as frequency and were compared with each other. Finally, the collected data were analyzed by SPSS18 software.

## Results

In this study, 1665 patients, in the period from March 2011 to March 2014 that were suffered from maxillofacial trauma, were examined.

The mean age of the participants in this study was  $26.14 \pm 15.23$  years and the mean length of stay for these patients was  $4.08 \pm 3.7$  days. Of 1665 patients studied, 1182 (71%) were male and 483 (29%) were female. Of which 737 (44.3%) were married, and 928 (55.7%) were single. Of these patients, 1276 (76.6%) due to a broken nose, and 153 (9.2%) due to mandibular and 101 (6.1%) due to maxillary, and 49 (2.9%) due to orbital and 152 (9.1%) due to face and the rest other cases were referred to Imam Khomeini Hospital and admitted to ENT department.

The frequency of fractures in 1665 patients is listed in full. That most frequency is related to fall and the lowest is related to bus accident.

**Table 1: Frequency of fractures in patients studied**

Fracture type	Frequency	Percentage
Passer	79	4.8
Cyclist	14	.9
Motorcycle	73	4.5
Car	241	14.7
Bus	6	.4
Fall	608	37.1
Strife	173	10.6
Collision	153	9.3

Not registered	206	12.6
Other	12	.7
Animal damage	74	4.5
Total	1639	100.0

Also in Table 1, frequency distribution of fractures in both males and females have shown that the difference in frequency varies according to the Chi-square statistic and sex and fracture have statistically significant relationship (P-value <0.001).

**Table 2: Frequency distribution of fracture for both males and females**

		Sex		Total
		Male	Female	
Passer	Number	50	29	79
	Percentage	63.3%	36.7%	100.0%
Cyclist	Number	13	1	14
	Percentage	92.9%	7.1%	100.0%
Motorcycle	Number	70	3	73
	Percentage	95.9%	4.1%	100.0%
Car	Number	174	67	241
	Percentage	72.2%	27.8%	100.0%
Bus	Number	5	1	6
	Percentage	83.3%	16.7%	100.0%
Fall	Number	384	224	608
	Percentage	63.2%	36.8%	100.0%
Strife	Number	143	30	173
	Percentage	82.7%	17.3%	100.0%
Collision	Number	111	42	153
	Percentage	72.5%	27.5%	100.0%
Not registered	Number	145	61	206
	Percentage	70.4%	29.6%	100.0%
Other	Number	7	5	12
	Percentage	58.3%	41.7%	100.0%
Animal damage	Number	66	8	74
	Percentage	89.2%	10.8%	100.0%
Total	Number	1168	471	1639
	Percentage	71.3%	28.7%	100.0%

Table 2 shows distribution of fractures in two groups of males and females that the level of significance for each type of fracture is reported separately.

The results of COX model estimation assuming PH is shown in Table 4 that HR for age and cause of fracture and mandibular and maxilla, orbit and other fractures have been reported in it, which by increasing one year of age the ratio of risk of discharge from the hospital was equal to 0.996, while the ratio for those with non-accident hazard with vehicles to those who with vehicle accident is equal to 0.0018, also the ratio for patients, who are not admitted because of mandibular and

maxilla fractures, orbit and other fractures, to those who are admitted for this purpose is shown in Table 3.

**Table 3: COX model assuming PH for mean duration of hospitalization in ENT**

Variable	Haz. Ratio	Std. Err.	z	P> z	{95% Conf. Interval}
Age	.9956717	.0018619	-2.32	0.020	.9920291 .9993277
Cause	.0018167	.0018186	-6.30	0.000	.0002554 .0129234
Mandibular	1.666574	.211162	4.03	0.000	1.300091 2.136366
Maxilla	1.548391	.2379144	2.85	0.004	1.145754 2.092522
Orbit	2.051043	.4521359	3.26	0.001	1.331479 3.159478
Other	2.384875	.2686839	7.71	0.000	1.912352 2.974154

## Discussion

In this study, we found that the ratio of male to female in Urmia is 2.4/1, which is similar to some studies {3.7/1 in Chennai <sup>[16]</sup>, 2.8/1 in Osaka <sup>[17]</sup>, 3.6/1 in Tokyo <sup>[18]</sup>}, but in contrast to some other studies {4.5/1 in Tehran <sup>[6]</sup>, 11/1 in UAE <sup>[19]</sup>, 4.7/1 in Nigeria <sup>[20]</sup>} is less. These different results in ratio of males to females can be due to this fact that in different communities the ratio of females who are exposed to maxillofacial trauma is different, but of all these studies it can be concluded that males are exposed to maxillofacial trauma more than females.

In the present study falling from height was the first cause of maxillofacial trauma and car accident was at the second rate. In Ryo sasaki et al. <sup>[18]</sup> study motorcycle accidents was the first cause of maxillofacial trauma and falls from height was ranked third. Also in Lida S et al. <sup>[17]</sup> study, accidents were ranked first and falls from height were second. In A. Leite cavalcanti <sup>[21]</sup> study, accidents were the most frequent cause of maxillofacial trauma injury, among them the motorcycle accident consisted the most cases and physical collision located at the second level of trauma. In this study, because the children were also studied and since maxillofacial trauma of this group was largely due to a fall from height, it seems the difference in the most common cause of maxillofacial trauma between our study and other studies is because of this.

Based on the results of this study, there is a significant relationship between type of fracture and fracture cause and gender. In the present study, male patients suffered more from maxillofacial trauma because of falling, conflicts and collisions with cars while females suffered more because of falling. While in Allareddy V et al. <sup>[22]</sup> study, maxillofacial trauma was because of fall and motorcycle accident in females and in male patients was because of collision and assault. In this study, there was a significant association between gender and facial fracture that is similar to our study. In Thiago Bittencourt et al. study <sup>[23]</sup> also younger male patients were more exposed to maxillofacial trauma than other groups but most of them were due to the conflict between individuals. In Kamath RA et al. <sup>[24]</sup> study male patients were mostly exposed to maxillofacial trauma due to road accident which is similar to our study. The results of COX model assuming PH indicate that with increasing age and vehicle accidents the length of stay increases. Assuming PH showed that with increasing age and vehicle accident the length of stay increases. In the present study the mean hospital stay was 4.08 days. In our study, the patients who had nasal fracture, admitted one or two days, and the average value is 4 days that patients with nasal fractures and

other fractures also had been hospitalized for a longer period. In Fabia Rocchia et al. <sup>[25]</sup> study, the most length of stay was 5.7 days for patients aged over 60 years. In Jonathan A Zelken et al. <sup>[26]</sup> study, mortality and length of hospital stay in elderly patients was significantly increased ( $P < 0.01$ ), which is similar to our study. The length of stay in patients who were referred due to motor vehicle accident was more than other causes of maxillofacial trauma. In Serjio Monteiro et al. <sup>[27]</sup> study, it was found that a motorcycle accident hospitalization was more than patients who had a bicycle accident and had more damage severity, which was due to more damage intensity. In our study, patients who referred due to accidents with vehicles (cars, motorcycles) were more severely damaged that it can be the reason for more stay.

Among types of fractures patients with other types of fractures and orbit and mandibular and maxillary, respectively shortening the duration of hospitalization in ENT increases. In other words, those who have been hospitalized because of other fractures less than mandibular fractures, maxillary and nose are resident in ENT. In the present study we concluded that those patients refer with maxillofacial fractures and other fractures to patients refer with only maxillofacial fractures, less hospitalized in ENT. On the other hand, in this study, more patients who had a broken nose hospitalized just one or two days in hospital or patients who have had maxillary or mandibular fracture hospitalized 3 to 4 days while patients who had maxillofacial and other fractures had been more hospitalized in the ENT department. In other words, moreover they hospitalized more time in the hospital; their stay up in other sectors was more than the ENT department. In a study by Edward Gray et al. <sup>[28-32]</sup> it was found that factors such as the severity of injury and complications during hospitalization (infectious, respiratory, blood) are of important predictors of length of stay in hospital. According to the above study and the results of the present study, it can be concluded that the more the severity, the more the length of stay, that this period affect other fractures of the maxillofacial fractures.

## Conclusion

Motor vehicles, due to being faster and more powerful, have also more severe injury that will subsequently increase the hospitalization time. And accordingly, expenses incurred by the patient and the hospital increases. For this reason, it is recommended both invest in terms of culture for compliance and safety in the use of vehicles and strict regulation taken in order to force people to comply with the safety in the use of vehicles.

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## Conflict of Interest

The authors have no conflicts of interest to declare for this study.

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